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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/653,390	09/01/2000	Salvatore Coffa	99CT22053527	7100

7590

06/26/2003

Christopher F Regan  
Allen Dyer Doppelt Milbrath & Gilchrist PA  
P O Box 3791  
Orlando, FL 32802-3791

EXAMINER

WILLE, DOUGLAS A

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 06/26/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/653,390

Applicant(s)

COFFA ET AL

Examiner

Douglas A Wille

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 02 May 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 28,30-39 and 41-47 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 28,30-39,40-47 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 30 and 39 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
3. Claims 30 and 39 refer to a base-collector region of a transistor. It is not understood where this transistor is. The fact that a p/n junction is formed does not mean that it forms the base-collector region. It could be claimed, in an equally inappropriate manner, that it forms the emitter-collection region of a bipolar transistor or one of the junctions of a Shockley or the drain-channel junction of a FET.
4. Claims 28, 30 - 39 and 41 - 47 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
5. Claims 28 and 38 refer to the rare earth as remaining in the depletion layer but the location and extent of the depletion layer are not described in the specification and the location and extent of the rare earth placement are also not described in the specification. It is not understood how such information can be derived.
6. Claims 28 and 38 refer to the rare earth as being buried at a sufficient depth to define an acceleration space but the location is not described in the specification. It is not understood how such information can be derived.

*Claim Status*

7. Amendment A, filed 9/1/02, provide three claims numbered 52, two claims numbered 51 and two claims numbered 53. The claims following the first appearance of claim 52 were renumbered 53 – 58. In view of the most recent amendment, the fate of claims 55 – 58 is uncertain.

*Claim Rejections - 35 USC § 103*

8. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

9. Claims 28, 30 - 39 and 41 - 47 rejected under 35 U.S.C. 103(a) as being unpatentable over Benton et al. in view of Franzo et al.

10. With respect to claims 28 and 38, in so far as they are understood, Benton et al. show a laser (cover Figure and column 2, line 59 et seq.) with a semiconductor substrate 31, a doped p/n junction 33-34 which inherently has a depletion region, a shape (ridge) defining a waveguide (column 3, line 67) and is doped with Er. The Er is in the core region 33 which will contain the depletion region. The device can serve as a coherent light source (laser) (column 4, line 67). Benton et al. do not show the biasing source but it is assumed to provide a forward bias, as is customary with a laser. Franzo et al. show that for Er doped Si diodes a higher output is obtained when a reverse bias is applied and it would have been obvious to modify the Benton et al. device to include the reverse bias shown by Franzo et al. to provide a greater output.

11. With respect to claims 30 and 39, the Er is in the core region which contains the depletion region and the region forms a p/n junction with the surrounding regions.

12. With respect to claims 31 and 41, the rare earth is Er.

Art Unit: 2814

13. With respect to claims 32 and 42, a clad layer of  $\text{SiO}_2$ , 23 is shown by Benton et al. (see Figure 2 and column 3, line 66) and this has a lower dielectric constant than the Si.
14. With respect to claims 33 and 46, the 32-33 interface provides a high index/low index intersection which functions as a reflection layer.
15. With respect to claims 34 and 44, forming the device on an SOI substrate is an obvious design alternative since the same device could be formed while gaining the advantages of the SOI structure such as isolation from substrate noise injection.
16. With respect to claims 35 and 45, Benton et al. show the layers are epi (column 4, line 27).
17. With respect to claims 36 and 43, the Benton et al. structure is ribbed.
18. With respect to claims 37 and 47, the Benton et al. substrate is Si.
19. Claims 28, 30 - 39 and 41 - 47 rejected under 35 U.S.C. 103(a) as being unpatentable over Benton et al. in view of Coffa et al.
20. With respect to claims 28 and 38, in so far as they are understood, Benton et al. show a laser (cover Figure and column 2, line 59 et seq.) with a semiconductor substrate 31, a doped p/n junction 33-34 which inherently has a depletion region, a shape (ridge) defining a waveguide (column 3, line 67) and is doped with Er. The Er is in the core region 33 which will contain the depletion region. The device can serve as a coherent light source (laser) (column 4, line 67). Benton et al. do not show the biasing source but it is assumed to provide a forward bias, as is customary with a laser. Coffa et al. show that for Er doped Si diodes a higher output is obtained when a reverse bias is applied and it would have been obvious to modify the Benton et al. device to include the reverse bias shown by Coffa et al. to provide a greater output. Note that neither

Benton et al. nor Coffa et al. show the biasing device but since a bias is applied it must obviously be supplied by a biasing device.

21. With respect to claims 30 and 39, the Er is in the core region which contains the depletion region and the region forms a p/n junction with the surrounding regions.
22. With respect to claims 31 and 41, the rare earth is Er.
23. With respect to claims 32 and 42, a clad layer of SiO<sub>2</sub>, 23 is shown by Benton et al. (see Figure 2 and column 3, line 66) and this has a lower dielectric constant than the Si.
24. With respect to claims 33 and 46, the 32-33 interface provides a high index/low index intersection which functions as a reflection layer.
25. With respect to claims 34 and 44, forming the device on an SOI substrate is an obvious design alternative since the same device could be formed while gaining the advantages of the SOI structure such as isolation from substrate noise injection.
26. With respect to claims 35 and 45, Benton et al. show the layers are epi (column 4, line 27).
27. With respect to claims 36 and 43, the Benton et al. structure is ribbed.
28. With respect to claims 37 and 47, the Benton et al. substrate is Si.

#### *Response to Arguments*

29. Applicant's arguments filed 9/5/02 have been fully considered but they are not persuasive.
30. Applicant argues that the claims are definite and quotes the specification but no bipolar device is shown in the specification. It is not understood why Applicant persists in describing a base/collector region. There is no base/collector junction. There is only a p/n junction.

Art Unit: 2814

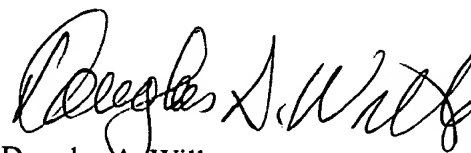
31. Applicant states that Benton et al. show a 4.2 K laser and that Franzo et al. and Coffa et al. describe LEDs and states that to form a laser an efficient electrical excitation has to be accompanied by inversion and a reduction of losses but note that Benton et al. shows lasing and both Franzo et al. and Coffa et al. show that room temperature emission can be obtained, which, with the resonator structure of Benton et al. provides a laser. Note also that Franzo et al. shows (see abstract) that all the Er atoms in the depletion region are excitable and Auger recombination is inhibited. Thus Franzo et al. show a low loss structure which will provide the room temperature laser.

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas A Wille whose telephone number is (703) 308-4949. The examiner can normally be reached on M-F (6:15-2:45).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



Douglas A. Wille  
Primary Examiner

June 24, 2003